

CLAIMS:

1. A glycodendrimer comprising carbohydrate moieties covalently linked to a carboxylic terminated dendrimer.
2. A glycodendrimer as claimed in claim 1 wherein the carboxy terminated dendrimer is a carboxy terminated poly(amidoamine) (PAMAM) dendrimer.
3. A glycodendrimer as claimed in claim 1 or claim 2 wherein the dendrimer comprises one or more generations of dendrimers from generation 1.5 to generation 9.5.
4. A glycodendrimer as claimed in any one of claims 1 to 3 wherein the dendrimer is or comprises a dendrimer generation 2.5.
5. A glycodendrimer as claimed in any one of claims 1 to 4 wherein the dendrimer is or comprises a dendrimer generation 3.5.
6. A glycodendrimer as claimed in any one of claims 1 to 5, wherein a carbohydrate moiety is a monosaccharide, disaccharide, trisaccharide, oligosaccharide or polysaccharide, or a combination of one or more thereof.
7. A glycodendrimer as claimed in any one of claims 1 to 6, wherein the carbohydrate moiety comprises one or more amine groups.
8. A glycodendrimer as claimed in any one of claims 1 to 5, where the carbohydrate group is an amino sugar or a sulphated amino sugar, which amino sugar or sulphated amino sugar may be modified.
9. A glycodendrimer as claimed in claim 8, wherein a modified amino sugar or sulphated amino sugar is acylated, for example, N-acylated.
10. A glycodendrimer as claimed in any one of claims 1 to 9, wherein the carbohydrate group is glucosamine, a glucosamine sulphate, N-acetyl glucosamine or an N-acetyl glucosamine sulphate.

11. A glycodendrimer as claimed in claim 10, wherein a glucosamine sulphate is glucosamine 6-sulphate, glucosamine 3,6-disulphate or glucosamine 3,4,6-trisulphate, and an N-acetyl glucosamine sulphate is N-acetyl glucosamine 6-sulphate, N-acetyl glucosamine 3,6-disulphate or N-acetyl glucosamine 3,4,6-trisulphate

12. A glycodendrimer as claimed in claim 1, which is dendrimer gen. 3.5-glucosamine, or dendrimer gen. 3.5-glucosamine 6-sulphate, or dendrimer gen. 3.5-N-acetylglucosamine, or dendrimer gen. 3.5-N-acetylglucosamine sulphate, or dendrimer gen. 3.5-mannosamine, or dendrimer gen. 3.5-mannosamine sulphate or dendrimer gen. 3.5-N-acetylmannosamine, or dendrimer gen. 3.5-N-acetylmannosamine sulphate, or a corresponding dendrimer gen. 2.5, or any combination thereof.

13. A glycodendrimer as claimed in claim 12 or claim 13, wherein the dendrimer is a PAMAM dendrimer.

14. A pharmaceutical formulation comprising a glycodendrimers as claimed in any one of claims 1 to 13 and a pharmaceutically acceptable carrier.

15. A pharmaceutical formulation as claimed in claim 14 wherein the concentration of the glycodendrimer is from 2.5 to 2,500 µg/ml, for example, from 25 to 250 µg/ml.

16. A pharmaceutical formulation as claimed in any one of claims 13 to 15 or a glycodendrimer as claimed in any one of claims 1 to 12, in a form suitable for administration intravenously, intra-arterially, into the lymphatic circulation, orally, intraperitoneally, topically, buccally, rectally, to the surface of the skin, transdermally, subcutaneously, intramuscularly, into the joint space, intranasally, intravitreally, by aerosol, or by pulmonary administration.

17. A pharmaceutical formulation as claimed in any one of claims 13 to 15, or a glycodendrimer as claimed in any of claims 1 to 12, in a form suitable for administration directly to the eye as eye drops, by deposition of a pellet in or around the eye, or by injection into any chamber within the eye, or by direct infusion through an organ.

18. A glycodendrimer as claimed in any one of claims 1 to 12 for use as a medicament.

19. A glycodendrimer as claimed in claim 18, for use as a medicament for the treatment of a disease in which chemokines and cytokines are increased.
20. A glycodendrimer as claimed in claim 18, for use as a medicament for the treatment of a disease in which angiogenesis is increased.
21. A glycodendrimer as claimed in claim 18, for use as a medicament for the treatment of a disease in which chemokines and cytokines are increased and angiogenesis is increased.
22. A glycodendrimer as claimed in claim 18, for use as a medicament for the treatment of severe sepsis, septic shock, the systemic inflammatory response associated with sepsis, rheumatological disease, eczema, psoriasis, contraction of tissues during wound healing, excessive scar formation during wound healing, transplant rejection, or graft versus host disease.
23. A glycodendrimer as claimed in claim 18, for use as a medicament for the treatment of rheumatoid arthritis, juvenile chronic arthritis, psoriatic arthritis, reactive arthritis occurring after an infection, acute ankylosing spondylitis, arthritis associated with inflammatory bowel disease, Behcet's disease including Behcet's disease with panuveitis and/or retinal vasculitis, inflammatory bowel disease (Crohn's disease, ulcerative colitis), or a disease associated with metastatic tumour cell growth.
24. A glycodendrimer as claimed in claim 22, wherein the transplant is a corneal, kidney, heart, lung, heart-lung, skin, liver, gut or bone marrow transplant.
25. A glycodendrimer as claimed in claim 22, wherein severe sepsis, septic shock or systemic inflammatory response associated with sepsis is caused by the lipopolysaccharide from gram negative bacteria, or a superantigen toxin from a gram positive bacterium.
26. Use of a glycodendrimer as claimed in any one of claims 1 to 12 for the manufacture of a medicament for the treatment of a disease or condition as defined in any one of claims 19 to 25.

27. A method of treating a subject to treat or prevent a disease or condition as defined in any of claims 19 to 25, comprising administering to the subject an amount of a glycodendrimer as claimed in any one of claims 1 to 12 effective to achieve the desired treatment..

28. A process for preparing a glycodendrimer as claimed in any one of claims 1 to 12 comprising covalently linking an amino functionalised carbohydrate to a carboxy terminated dendrimer, wherein the covalent linkage is achieved by the use of a coupling reagent.

29. A process as claimed in claim 28, wherein the coupling reagent is a carbodimide coupling reagent.

30. A process as claimed in claim 29, wherein the coupling reagent is 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride.

31. A process as claimed in any one of claims 28 to 30, wherein an amino functionalised carbohydrate is a monosaccharide, disaccharide, trisaccharide, oligosaccharide or polysaccharide.

32. A process as claimed in claim 31, wherein the carbohydrate is a monosaccharide, disaccharide, trisaccharide, oligosaccharide or polysaccharide functionalised with one or more reactive amine groups.

33. A process as claimed in claim 32, wherein an amine group is a primary amine group.

34. A process as claimed in any one of claims 28 to 30, wherein the carbohydrate is glucosamine or a sulfated glucosamine, mannosamine or a sulphated mannosamine, galactosamine or a sulfated galactosamine, N-acetyl glucosamine or a sulfated N-acetyl glucosamine, N-acetyl mannosamine or a sulphated N-acetyl mannosamine, N-acetyl galactosamine or a sulfated N-acetyl galactosamine, or any combination thereof.

35. A process as claimed in claim 34, wherein a sulphated glucosamine is D-glucosamine 6 sulphate, D-glucosamine 3,6-disulphate or D-glucosamine 3,4,6 trisulphate, D-glucosamine 3-sulphate, D-glucosamine 4-sulphate, D-glucosamine 3,4 disulphate, or D-glucosamine 4,6 disulphate.

36. A process as claimed in any of claims 28 to 35, carried out at a temperature not greater than 40°C.

37. A process as claimed in any one of claims 28 to 36, carried out without the application of an external, additional energy source.

38. A process as claimed in any of claims 28 to 37, which is carried out in aqueous solution.

39. A glycodendrimer as defined in any one of claims 1 to 12, obtainable by a process comprising covalently linking an amino functionalised carbohydrate to a carboxy terminated dendrimer using a coupling reagent, the covalent linkage being carried out in an aqueous medium.

40. A glycodendrimer as claimed in claim 39, wherein the process is carried out as defined in any one of claims 29 to 37.

41. A pharmaceutical formulation as claimed in any one of claims 13 to 17, wherein the glycodendrimer as claimed in claim 39 or claim 40.

42. A glycodendrimer as claimed in any one of claims 18 to 25 wherein the glycodendrimer is as claimed in claim 39 or claim 40.

43. Use of a glycodendrimer as claimed in claim 26, wherein the glycodendrimer is as claimed in claim 39 or claim 40

44. A method of treatment as claimed in claim 28, wherein the glycodendrimer is as claimed in claim 39 or claim 40.

45. A method comprising treating a tissue or organ for transplantation with a glycodendrimer as claimed in any one of claims 1 to 13, 39 and 40 *in vitro* before transplantation.

46. A method as claimed in claim 45, wherein the tissue or organ is a cornea.

47. A process to covalently link a molecule, for example, a biologically active molecule, to an anionic dendrimer wherein the dendrimer is reacted with the biologically active molecule in the presence of a coupling agent, for example, a carbodiimide coupling agent.